

Remarks

The applicants have amended claims 1, 7, 9, 10, 15, 17, 25, and 29, and have cancelled claims 20-24. Claims 1-9 and 25-33 are currently pending. In light of the foregoing amendments and the following remarks, the applicants respectfully request withdrawal of the pending rejections and advancement of this application to allowance.

A. Objection to the Specification

There is an objection to the specification because the length exceeded 150 words. The applicants thank the examiner for pointing out the length of the abstract and have amended the specification to submit a shorter abstract that is under 150 words. The applicants request withdrawal of the pending objection.

B. Information Disclosure Statement

The office action notes that the references cited in the specification are not considered unless they are submitted in a separate paper or are cited on form PTO-892. The applicants thank the examiner for pointing out this issue. The only reference cited in the specification is U.S. Patent 5,565,788, which is already listed on Form PTO-892. The applicants have, however, filed concurrently herewith an Information Disclosure Statement to disclose some additional references.

C. Objection to the Claims

There is an objection to claims 20-28 because they embrace or overlap two different statutory classes, namely a method of testing and a method of manufacturing. The applicants respectfully traverse this objection. However, to advance this application to allowance, the applicants have cancelled claims 20-24 and have amended claims 25-28 accordingly.

The applicants respectfully request reconsideration and withdrawal of the pending objection.

D. Rejection under 35 U.S.C. § 112

Claims 1-9 stand rejected as being indefinite for various occurrences of insufficient antecedent basis. The applicants respectfully traverse these rejections. However, to advance this application to allowance, the applicants have amended the claims to correct the various antecedent basis issues noted in the office action.

The applicants respectfully request reconsideration and withdrawal of the pending rejection.

E. Rejections Under 35 U.S.C. § 102

1. Claims 1-6 and 9

Claims 1-6 and 9 stand rejected as being anticipated by Taura et al. The applicants respectfully traverse this rejection.

Taura et al. discloses a structure in which a signal contact 101 is positioned between ground contacts 102 and 102A. This structure forms a ground-signal-ground configuration for the probes. It does not disclose a structure that has a signal-ground-signal configuration.

In sharp contrast, claim 1 (and hence dependent claims 2-6 and 9) is directed to a test probe structure in which there are two or more signal probe tips and the ground contact surface is positioned between at least two of the signal probe tips. This structure provides a signal-ground-signal configuration for the probe tips and ground contact surface. Taura et al. fails to disclose this structure.

Therefore, the applicants respectfully request reconsideration and withdrawal of the pending rejection.

2. Claim 14

Claim 14 stands rejected as being anticipated by Logan. The applicants respectfully traverse this rejection.

Logan discloses a structure that has only two probes, one signal probe and one ground probe. With reference to Figure 3, the specification explains that one of the needles 32 is attached to the microstrip 26. This first needle thus forms a signal probe. The specification goes on to explain that the second needle 32 is on the metalized ground plane 30. See col. 5, line 65--col. 6, lines 7. This second needle forms a ground probe.

Logan does not disclose a structure that has three electrical contact points having a signal-ground-signal configuration.

In sharp contrast, claim 14 is directed to a test probe structure that has first and second signal probe tips and has a single ground contact surface positioned between the signal probe tips. This structure provides a signal-ground-signal configuration for the probe tips and ground contact surface. Logan fails to disclose this structure.

Therefore, the applicants respectfully requests reconsideration and withdrawal of the pending rejection.

F. Rejections Under 35 U.S.C. § 103

1. Claims 7 and 8

Claims 7 and 8 stand rejected as being obvious over claims Taura et al. in view of Abe. The applicants respectfully traverse this rejection.

Claims 7 and 8 depend from claim 1 and thus are distinguished above from Taura et al., which fails to teach or suggest a test probe structure in which there are two or more signal probe tips and the ground contact surface is positioned between at least two of the signal probe tips.

Similarly, Abe discloses a structure in which a signal electrode 41a is positioned between two ground electrodes 41b to form a ground-signal-ground configuration. See, for example, Figures 2(a) and col. 5, lines 14-31, col. 7, line 66- col. 8, line 5. Abe also fails to teach or suggest a test probe structure in which there are two or more signal probe tips and the ground contact surface is positioned between at least two of the signal probe tips.

No combination of Taura et al. and Abe will result in the claimed structure. Furthermore, there is no teachings in these references to otherwise suggest modifying them to form the claimed structure. Therefore, the applicants respectfully request reconsideration and withdrawal of the pending rejection.

2. Claims 15 and 16

Claims 15 and 16 stand rejected as being obvious over Logan in view of Taura et al. The applicants respectfully traverse this rejection.

Claims 15 and 16 depend from claim 14, which was distinguished above from both Logan and Taura et al. No combination of these references will result in the claimed structure. Furthermore, there are no teachings in these references to otherwise suggest modifying them to form the claimed structure. The applicants respectfully submit that claims 15 and 16 are patentably distinct from these references for the same reasons and request withdrawal of the pending rejection.

3. Claims 10-13, 17-19, 20, 23, and 25-33

Claims 10-13, 17-19, 20, 23, and 25-33 stand rejected as being obvious over Abe in view of Taura et al. and Itoyama. The applicants respectfully traverse this rejection.

a. Claims 10-13

As discussed above, Abe and Taura et al. fail to teach or suggest a test probe structure in which there are two or more signal probe tips and the ground contact surface is positioned between at least two of the signal probe tips.

Itoyama also fails to teach or suggest such a structure. It is directed to location of a test head relative to a chip or work piece and merely discloses a plurality of probe needles. It does not teach or suggest a test probe structure in which there are two or more signal probe tips and the ground contact surface is positioned between at least two of the signal probe tips.

No combination of Abe, Taura et al., and Itoyama will result in the claimed structure. There is no teachings in these reference to otherwise suggest modifying them to form the claimed structure. Therefore, the applicants respectfully request reconsideration and withdrawal of the pending rejection.

b. Claims 17-19

Claim 17 (and hence dependent claims 18 and 19) sets for a method in which the acts include providing a structure in which there are two or more signal probe tips and the ground contact surface is positioned between at least two of the signal probes and establishing a signal path between two of the signal probe tips positioned on opposite sides of the ground contact surface.

As discussed above, Abe, Taura et al., and Itoyama fail to teach or suggest a structure in which a ground probe is positioned between the two or more signal probe tips. It follows that these three references also fail to teach the act of establishing a signal

path between two of the signal probe tips positioned on opposite sides of the ground contact structure. No combination of these references would result in either of these acts by themselves or the claimed combination of acts. Therefore, the applicants respectfully request reconsideration and withdrawal of the pending rejection.

c. Claims 20 and 23

Claims 20 and 23 were cancelled. Accordingly, the rejection of these claims is now moot.

d. Claims 25-28

In rejecting these claims, the office action states that they "essentially recite the same structural limitations as in claims 10-13." However, the claims are method claims that recite a combination of acts. They recite acts involved with testing a device.

The office action points only to structure. It does not point to any teaching in the cited references that suggests the acts of "sensing electrical communication between the first test-head contact and the first-head conductive region" or "automatically introducing a test signal through the second test-head contact into the electronic assembly in response to sensing electrical communication between the first test-head contact and second conductive region."

Accordingly, the applicants respectfully request reconsideration and withdrawal of the pending rejections.

e. Claims 29 and 30

The claimed invention discloses the act of "contacting the ground pad with a ground probe, with the ground probe having a surface overhanging a major surface of the signal port and being substantially parallel to the major surface" and "adjusting the depth of the ground contact thereby positioning the overhanging portion of the ground probe a predetermined distance from the first signal port and establishing a predetermined impedance of the first signal port." An advantage of this combination of acts is that it permits one to reconfigure the test head for other characteristic impedances, and/or electronic assemblies with other contact distributions, shapes, and/or dimensions.

The cited references fail to teach or suggest this claimed combination of acts. For example, Abe discloses placing a shielding member over the device under test to match the performance characteristics of the device while it is on a wafer to the device as it

would be in a packages state. Col. 3, lines 17-21. It does not teach or suggest adjusting the depth of a ground contact thereby positioning the overhanging portion of the ground probe a predetermined distance from the first signal port and establishing a predetermined impedance.

Additionally, Figures 13A-13C of Taura et al. illustrate a cross-sectional view of the probe. The figures illustrate the electrode 401 sandwiched between two ground electrodes 402. See col. 10, lines 42-52. Taura et al. fails to teach or suggest a ground probe overhanging the signal port. It also fails to teach or suggest adjusting the depth of the ground contact thereby positioning the overhanging portion of the ground probe a predetermined distance from the first signal port and establishing a predetermined impedance.

Itoyama also fails to teach or suggest a ground probe overhanging the signal port. It also fails to teach or suggest adjusting the depth of the ground contact thereby positioning the overhanging portion of the ground probe a predetermined distance from the first signal port and establishing a predetermined impedance.

Therefore no combination of Abe, Taura et al., or Itoyama will result in the claimed combination of acts, which include adjusting the depth of the ground contact. The applicants respectfully request reconsideration and withdrawal of the pending rejection.

f. Claims 31-33

Claim 31 (and hence dependent claims 32 and 33) sets forth a combination of acts that include "changing at least one of the first and second conductive probes to enable the test head to establish a second nominal characteristic impedance different from the first nominal characteristic impedance or to establish the first nominal characteristic impedance with a different arrangement of conductive portions on a second electronic assembly." An advantage of this combination of acts is that it permits one to reconfigure the test head for other characteristic impedances, and/or electronic assemblies with other contact distributions, shapes, and/or dimensions. The cited references fail to teach or suggest this claimed combination of acts.

Additionally, the office action summarily states that the method claims recite the same limitations in the method already considered, and does not provide any explanation

as to why one skilled in the art would have found the claimed combination of acts obvious in light of the cited references (M.P.E.P. § 706.02(j)). It leaves the applicant to speculate as to the basis for the rejection.

The applicants respectfully request reconsideration and withdrawal of the cited references.

4. Claims 21 and 22

Claims 21 and 22 were cancelled. Accordingly, the rejection of these claims is now moot.

5. Claims 8, 12, and 32

Claims 8, 12, and 32 were rejected as being obvious over Taura et al. in view of Abe, Itoyama, Cleason et al., Matsunaga et al., and Boyette, Jr. et al. The applicants respectfully traverse this rejection.

a. Claims 8 and 12

Claims 8 and 12 depend from claim 1, which includes a test probe structure in which there are two or more signal probe tips and the ground contact surface is positioned between at least two of the signal probe tips. As discussed above, Taura et al. and Abe fail to teach or suggest any combination of elements that include this structure.

Itoyama, Cleason et al., Matsunaga et al., and Boyette, Jr. et al. also fail to teach or suggest this structure. Accordingly, no combination of these references will result in the claimed structure, and the applicants respectfully request reconsideration and withdrawal of the pending rejection.

b. Claim 32

Claim 32 includes the limitations of claim 31, which was distinguished above from Taura et al., Abe, and Itoyama.

Additionally, Cleason et al., Matsunaga et al., and Boyette, Jr. et al. also fail to teach or suggest a combination of acts that includes "changing at least one of the first and second conductive probes to enable the test head to establish a second nominal characteristic impedance different from the first nominal characteristic impedance or to establish the first nominal characteristic impedance with a different arrangement of conductive portions on a second electronic assembly."

Therefor, no combination of the cited references will result in the claimed structure and the applicants respectfully request reconsideration and withdrawal of the pending rejection.

CONCLUSION

In light of the foregoing amendments and remarks, the applicants request withdrawal of the pending objections and rejections and allowance of all the pending claims. Although certain arguments were set forth supporting the patentability of the claims, the applicants note there may be other reasons and arguments that the original claims and the amended claims are patentably distinct. The applicants reserve the right to raise any such argument in the future and to pursue any claim scope in the future that is supported by the disclosure set forth in the application. The changes made to the specification and claims by the current amendment are attached hereto in a page entitled "Version with Markings to Show Changes Made."

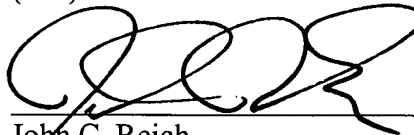
Please contact the undersigned attorney if there are any questions.

Respectfully submitted,

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October 9, 2002



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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Specification

In The Abstract

Please replace the Abstract with the following new Abstract:

A test probe for a high-frequency device having an electronic circuit with two or more contact regions. The test probe comprises two or more signal probe tips. Each signal probe tip has a contact surface area for contacting one of the contact regions of the device. A ground probe has a ground contact surface with a surface area substantially greater than the contact surface area of the one signal probe tip for contacting another one of the contact regions of the electronic circuit. The ground probe is positioned between at least two of the signal probes.

B. In the Claims

Claims 20-24 are cancelled.

Claims 1, 7, 9, 10, 15, 17, 25, and 29 are amended as follows:

1. (Amended) A test probe for a high-frequency device having an electronic circuit with two or more contact regions, the test probe comprising:

two or more [at least one] signal probe tips, each signal probe tip having a contact surface area for contacting one of the contact regions of the device; and

a ground probe having a ground contact surface with a surface area substantially greater than the contact surface area of the one signal probe tip for contacting another one of the contact regions of the electronic circuit, wherein the ground contact surface is positioned between at least two of the signal probe tips.

7. (Amended) The test probe of claim 1, wherein the device includes at least one DC contact region for receiving a DC bias input, and wherein the test probe [head] further comprises at least one DC bias tip for contacting the one DC contact region and providing a DC bias signal.

9. (Amended) The test probe [fixture] of claim 1, wherein the electronic circuit is mounted on a work surface and one signal probe tip has a tip axis which defines a non-right angle with the work surface.

10. (Amended) A test system for testing two or more microwave devices, with each device having at least one signal port, at least one ground pad, and at least one DC input-output pad, the system comprising:

a work surface for supporting the two or more microwave devices;

a test head including:

two or more [at least one] signal probe tips, each signal probe tip having a contact surface area for contacting a [the one] signal port of a first one of the microwave devices; [and]

a first ground probe having a ground contact surface with a contact surface area substantially greater than the contact surface area of the one signal probe tip for contacting the one ground pad of the first one of the microwave devices,
wherein the first ground contact surface is positioned between at least two of the signal probe tips; and

programmable means for sequentially moving the test head into alignment with each of the microwave devices on the work surface and for bringing the signal probe tip into contact with the one signal port of each microwave device and the contact surface of the first ground probe into contact with the one ground pad of each microwave device.

15. (Amended) The test probe of claim 14, wherein:

the first and second signal probe tips have respective first and second contact areas; and

[wherein] the ground structure includes a ground contact area which is greater than at least one of the first and second contact areas.

17. (Amended) A method of testing microwave or high-frequency devices, with each device having at least one signal port, at least one ground pad, and at least one DC input-output pad, the method comprising:

providing a test head comprising two or more [at least one] signal probe tips, each probe tip having a contact surface area, and a first ground probe having a ground contact surface with a ground contact surface area substantially greater than the contact surface area of the one signal probe tip, the ground contact surface being positioned between at least two of the signal probe tips; [and]

moving the [signal probe tip] contact surface of each of the signal probe tips into contact with [the one] a signal port of a first one of the devices and the contact surface of the first ground probe into contact with the one ground pad of the first one of the devices, thereby establishing a signal path between two of the signal probe tips positioned on opposite sides of the ground contact surface.

25. (Amended) A method of testing [manufacturing] a device comprising a high-frequency electronic assembly having at least first and second conductive regions, the method comprising:

providing a test head having first and second test-head contacts;

establishing electrical communication between the first test-head contact and the first conductive region and between the second test-head contact and the second conductive region;

sensing electrical communication between the first test-head contact and the first-head conductive region;

automatically introducing a test signal through the second test-head contact into the electronic assembly in response to sensing electrical communication between the first test-head contact and second conductive region.

29. (Amended) For a surface-mount package having first and second signal ports and a ground pad between the signal ports, a method of establishing an electrical coupling of a predetermined nominal characteristic impedance with at least the first signal ports, the method comprising:

contacting the first signal port with a first electrical conductor; [and]

contacting the ground pad with a ground probe, with the ground probe having a ground contact and a surface overhanging a major surface of the signal port and being substantially parallel to the major surface; and

adjusting the depth of the ground contact thereby positioning the overhanging portion of the ground probe a predetermined distance from the first signal port and establishing a predetermined impedance of the first signal port